

# Florida Organic Aquaculture

## AUTOMATION LEADS ORGANIC SHRIMP PRODUCER TO THE FOREFRONT

The steady growth of Florida Organic Aquaculture, LLC's shrimp production facility reflects the high consumer demand for American-raised, additive-free, sustainably produced shrimp. It also reflects the critical role of automation in the efficient commercial production of Pacific white shrimp (*Litopenaeus vannamei*), where small changes in the growing environment can have huge impacts.

Searching for a sustainable food production venture, South African businessman Clifford Morris established **Florida Organic Aquaculture** (FOA) in Fellsmere, Florida, on fallow farmland near the Atlantic coastal city of Vero Beach.

Since the company's inception in 2013, FOA has built from the ground-up a production building that covers 4.2 acres and features 20 individual raceways, each of which contains 225,000 gallons of water and 500,000 shrimp. FOA is in the process of ramping up production to ultimately produce more than 1 million pounds of shrimp per production building annually.

A second production building—which stands as the model for a growth plan that ultimately encompasses six more production buildings—is designed around 16 raceways, each with 280,000 gallons of water and biofloc, precisely controlled through state-of-the-art automation.

Increasing its production capacity and shortening the production cycle from four months to three through careful management will help FOA earn a larger share of a global market that industry experts predict will rise from today's annual consumption levels of nearly 8 million metric tons of farm-raised shrimp to 18 million metric tons by 2030.

FOA's goal is to set a higher bar for sustainability in shrimp production. A fully recirculated water system eliminates environmental discharge from the raceways. Makeup water is sourced from an 2,300-foot-deep seawater well, de-gassed and introduced directly to the raceways. Fresh water is drawn from a shallower well on the property.

**END USER:** Florida Organic Aquaculture (FOA)  
**CLIENT:** Matt Gabrielli: Technical Supervisor, FOA  
**MORE INFO:** Learn about FOA, visit: [FLAquaCulture.com](http://FLAquaCulture.com)



Fresh Shrimp: High-Quality Fresh Shrimp Harvested from Florida Organic Aquaculture. Image credit: FOA.



Moved from harvest to processing floor in totes of ice and water, the shrimp are de-headed or peeled and de-veined and kept chilled. That extends their shelf life—another aspect of sustainability. Shortening the growth cycle will be a further eco-friendly improvement, turning energy into food at a more rapid and efficient rate.

### Managing Biofloc and Dissolved Oxygen

The biofloc system provides a rich nutrient source for the shrimp—Morris calls it “golden water”—but requires careful oversight. As shrimp mature, biomass in each tank approaches maximum levels, and careful management of pH and dissolved oxygen (DO) becomes critical.

**Matt Gabrielli**, Technical Supervisor for Florida Organic Aquaculture, explains that a staff biologist monitors ammonia, nitrate-N, pH, temperature and dissolved oxygen every day with a YSI Professional Plus with a Quatro cable.

The biologist also keeps daily track of settled solids and total suspended solids (TSS).

“But by the time he’s gotten to Tank 20, there’s a chance that something’s changed in Tank 1,” Gabrielli notes. “You can never take the human element out of animal husbandry, but automation is very important to profitability within an aquaculture system.”

Along with hiring a biologist to take manual readings, FOA’s first production building employs staff to handle many systems manually, from environmental management to feeding. With automated systems now in place, these highly skilled workers are able to branch out into new production buildings to lead the company’s growth, says Gabrielli.

“We operate Production Building 1 with 12 employees on a rotating 24-hour schedule,” he explains. “Future production buildings will be able to be operated by six people—three shifts with one to two people per shift, greatly reducing full-time employee requirements as we scale.”

### Fully Linked

FOA’s second barn is the model for the company’s future. For every two raceways, a YSI 5500D multi-optical dissolved oxygen instrument continually monitors pH and DO. Four YSI 5500Ds feed into a YSI IOEM (Input/Output Expansion Module), which control variable-frequency drive (VFD) pumps that feed oxygen into the tanks. The DO instruments also convey their readings to a pair of YSI Relay Expansion Modules (REMs), which communicate with the automated feeding system from AKVA.



Just the Beginning: Aerial View of One of FOA’s Original Production Buildings. Image credit: FOA.



FOA Employee Using the 5500D Optical Dissolved Oxygen Instrument from YSI. Image credit: FOA.

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Up-to-the-minute data is the foundation of FOA's growth and management program, says Gabrielli, and is vital to the success of the production system from hour to hour.

"We don't have oxygen generators," he notes. "All the dissolved oxygen in the system is injected from the atmosphere by Venturi nozzles, which are driven by MDM pumps controlled by variable-frequency drives. The DO sensors and IOEM are communicating directly to the lead pump, saying, 'you're low; you need to speed up and pull more air into the tank.'

**"If the DO is low enough, an alert message is sent out so we know what the level is and we can monitor that it's heading back in the right direction," Gabrielli adds.**

The DO monitoring system also triggers programmable relays in the YSI REMs to start or stop feeding based on oxygen levels—an indicator of biological load. DO measurements are input into FOA managers' formula for feed demand, which also takes into account daily changes in the biomass in each raceway. Through meticulous, automated feed management, waste is reduced, the value of biofloc is maximized, and the raceway environment is maintained at optimal levels for health and production.

### **Reducing Energy Demand**

Temperature data is conveyed to fans and ridge vents that evacuate built-up carbon dioxide and allow air exchange for efficient climate control. That is especially important during the hot Florida summers.

"In the summer months, temperature control is really important," Gabrielli points out.

"The building management system has fans that are wired to turn up X fan or turn down Y fan based on temperature."

Automated fan and pump management also contribute to FOA's sustainability by fine-tuning energy demand—all fans operate on a demand basis, while the pumps in the new facility will continue to run on variable-frequency drives to reduce overall energy costs.



One of the Clusters of YSI IOEM and REM Instruments Providing Continuous and Automated Control.



Biofloc in FOA's Shrimp Facility. Image credit: FOA.

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## Global Plans

Florida Organic Aquaculture, LLC shrimp is sold year-'round to local and regional supermarkets, fine Florida restaurants and a retail outlet in the company's hometown of Fellsmere. Morris says his long-term plan is to grow beyond Florida, to the rest of the USA and Canada, bringing his high-tech, organic production methods to promising markets – where discerning consumers are eager for local, all-natural food—and eventually expanding into the lucrative European market as well.

Meeting those needs will hinge on automation and efficiency.

“Florida Organic Aquaculture is at the cutting edge of integrating monitoring and automation systems to ensure sustainability at every level,” says Darrin Honious, of YSI in Yellow Springs, Ohio. “With this network of our 5500D monitoring instruments and IOEM and REM controllers and relays, FOA is optimizing production, reducing energy and feed costs, and creating a business that is both economically and environmentally sustainable.”

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5500D MultiDO Optical Monitoring and Control Instrument

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